Lesson 2.7

Writing a Final Argument

Overview

Students complete a second scientific argument that they will contribute to the Microbiome Research Institute for an upcoming press release. They work with the evidence that they evaluated in the previous lesson. In preparation for writing, they organize this evidence in the Reasoning Tool. In the second half of this lesson, students begin writing their final arguments, using their Reasoning Tools for support. Students' written arguments also serve as three-dimensional performance assessments, with rubrics provided to indicate student progress with unit-specific science concepts; the crosscutting concept of Scale, Proportion and Quantity; and the science practices of Constructing Explanations; Engaging in Argument from Evidence; and Obtaining, Evaluating and Communicating Information. In particular, the assessment of science practices can serve as a pre-assessment from which you can support students' growth in writing throughout the year. The purpose of this lesson is for students to apply the knowledge and expertise they have developed over the past several lessons to constructing a scientific argument about fecal transplants.

Anchor Phenomenon: A fecal transplant procedure cured Patient 23 of a potentially deadly infection.

Students learn:

- In a convincing argument, the connections between the evidence and the claim are made clear.
- Scientific values function as criteria in distinguishing between science and nonscience.

Lesson at a Glance

ACTIVITY

1 **Warm-Up** (5 min)
To review what students have learned about scientific argumentation, students evaluate an argument that is not supported by evidence.

WARM-UP

2 **Using the Reasoning Tool** (20 min)
Students use the Reasoning Tool to organize evidence from the previous lesson as preparation for writing their final arguments.

WRITING

3 **Writing Final Argument Paragraphs** (20 min)
Students apply what they have learned about both microorganisms and scientific argumentation to their final written arguments about how fecal transplants work. Student writing represents an opportunity for students to demonstrate understanding through a three-dimensional performance. You can refer to Rubrics for Assessing Students' Written Arguments (in Digital Resources) when you score student writing.

WRITING

4 **Homework**
Students reflect on the components of a strong argument as they evaluate and revise their own writing.

HOMEWORK

5 **Family Homework Experience (optional)**
Explaining the human microbiome to a member of their household supports student learning through shared experiences with family.

HOMEWORK

Materials & Preparation

Materials

For the Class

- marker, wide tip*

For Each Pair of Students

- Bacteria Evidence Cards (10 cards/set), clipped together
- Bacteria Evidence Subclaims (2 cards/set), clipped to Bacteria Evidence Cards
- Evidence Gradient

For Each Student

- optional: *Microbiome* Investigation Notebook, pages 63–71*
- optional: Family Homework Experience: Explaining the Human Microbiome at Home student sheet*

*teacher provided

Preparation

Before the Day of the Lesson

1. Watch a video from the Argumentation Toolkit. The Lawrence Hall of Science has developed a collection of short videos to support teachers as they implement scientific argumentation in their classrooms. Watch the video *Strategy: Writing an Argument Using the Reasoning Tool*, located in Digital Resources, for more information on scientific argumentation. You can find additional resources to support teaching argumentation at www.argumentationtoolkit.org.
2. Gather Bacteria Evidence Cards, Bacteria Evidence Subclaims, and Evidence Gradients from Lesson 2.6. Students will use these materials to help them write their final arguments in today's lesson.

VOCABULARY

- antibiotics
- bacteria
- claim
- evidence
- microorganism
- reasoning
- scale
- scientific argument

UNPLUGGED?

Digital Devices Not Required

This lesson can be taught without digital devices. If students do not have devices, print copies of the Investigation Notebook pages for this lesson. (A PDF file can be found in Digital Resources.)

If students do not have access to Amplify Science at home, provide them with copies of pages 63–71 from the Investigation Notebook. In addition, if you plan to have students complete the Family Homework Experience assignment, each student will also need a printed copy of the Family Homework Experience student sheet (in Digital Resources).

3. Prepare for On-the-Fly Assessment. Activity 3 of this lesson includes an opportunity to informally assess students' understanding of interdependent relationships in ecosystems in their written arguments. Press the hummingbird icon and select ON-THE-FLY ASSESSMENT for details about what to look for and how you can use the information to maximize learning by all students.
4. Prepare for final writing assignment in Activity 3. This is a complex written piece. You may want to reserve additional class time for students to complete their written arguments. Rubrics to assess students' understanding of core concepts; the crosscutting concept of Scale, Proportion and Quantity; as well as their developing practices of Constructing Explanations, Engaging in Argument from Evidence, and Obtaining, Evaluating and Communicating Information are provided in the Rubrics for Assessing Students' Written Arguments (in Digital Resources). In order to support students' writing, decide if you would like to share the rubrics with the class. You could also review a sample student argument (see the Teacher Support tab in Activity 3).
5. Preview optional Family Experience Homework in Activity 5. For part of tonight's homework, students can explain what they are learning about the human microbiome to a member of their household. If you decide to assign this homework and students do not have access to Amplify Science at home, make copies of the student sheet (in Digital Resources). Set aside a few moments at the end of class to introduce the activity and explain that students will need to interact with one or more members of their household in order to complete the assignment.

DIGITAL RESOURCES

Video: Strategy: Writing an Argument Using the Reasoning Tool

Microbiome Glossary

Microbiome Multi-Language Glossary

Family Homework Experience: Explaining the Human Microbiome at Home copymaster

Completed Scientific Argumentation Wall

Rubrics for Assessing Students' Written Arguments

Microbiome Investigation Notebook, pages 63–70

Immediately Before the Lesson

1. Have on hand the following materials:
    - marker
    - Bacteria Evidence Cards and Subclaims
    - Evidence Gradients
    - optional: digital devices
    - optional: *Microbiome* Investigation Notebook, pages 63–71
    - optional: copies of Family Homework Experience student sheets

Between-Class Prep

1. Have Bacteria Evidence Cards, Subclaims, and Evidence Gradients ready for your next class.

At the End of the Day

1. Gather and store Bacteria Evidence Card Sets and Evidence Gradients for the next time you teach this unit.
2. Prepare the classroom wall for the next unit. Leave the scientific argumentation wall intact for your next unit. You may also want to leave the hanging display of Scale Cards and the Active Reading Guidelines poster, as well.
3. Add example student arguments to the scientific argumentation wall. At the end of the lesson, you may want to post student examples of exemplary scientific arguments on the scientific argumentation wall so there is a reference available for the next unit.

Differentiation

Embedded Supports for Diverse Learners

Organization time and supports for writing a scientific argument. The work students did with the Evidence Gradient in the last lesson offers an important support for the work students will do with the Reasoning Tool in this lesson. The Bacteria Evidence Card Sort provides a record of students' initial thinking and discussion about the evidence. The Reasoning Tool itself is an embedded support for the writing that is conducted at the end of this lesson as it lays out the evidence and connections that students will include in their written arguments.

Potential Challenges in This Lesson

Complex activities with independent and paired work. Students are asked to transfer their thinking from their work with the Evidence Gradient into their work with the digital Reasoning Tool. Pairs will need to share their completed Bacteria Evidence Card Sorts, but they will need to independently work with the Reasoning Tool on their own digital devices. Finally, students will begin to independently write arguments on their digital devices at the end of the lesson. You may need to make adjustments for students who will struggle with these challenges.

Specific Differentiation Strategies for English Learners

More teacher modeling of writing. You may want to support student writing by offering more modeling than is outlined in this lesson. For instance, you may want to model more specifically how they can use the work they did in the Reasoning Tool to build their written arguments.

Supporting students to demonstrate their learning in writing. This lesson includes a writing assignment with written prompts in English. Some English learners, especially those at the early Emerging level of English language proficiency (i.e., Newcomer ELs) may experience more success expressing their ideas when provided a few different options. It would be appropriate for this group of students to read the prompts and express their ideas in writing, using their primary language. Providing students with this opportunity allows them to show what they know about the science concepts, rather than whether or not they can express their understanding of concepts in English. After students have written in their primary language, you may ask them to explain what they wrote as you record their ideas. If this discussion is done in English, it will provide you with insights into how they use English to express their knowledge. It may also be appropriate for these students to express their ideas by using labeled drawings or diagrams rather than providing purely written responses. After students have recorded their responses in this way, you may invite them to elaborate orally as you record their ideas. Providing students with alternate ways of expressing understanding can ensure that you will have an accurate understanding of your students' understanding of the content as well as more accurate measures of students' growth in content understanding. Additionally, consider providing a structured time for students to share their ideas orally with a partner before they write their final argument.

Specific Differentiation Strategies for Students Who Need More Support

Alternative grouping and teacher modeling. The cognitive work done with the Reasoning Tool may be difficult for some students. If this is the case, gather small groups of students who are working on the same argument and orally discuss each piece of evidence that students chose. Hold a short, student-centered discussion about how they might complete the middle column for each row of the Reasoning Tool, providing this support until you feel that the gathered students can continue to work independently. You may also think about which rows of the Reasoning Tool are the easiest for students to tackle and ask students to start by working on those. Continue to gather small groups and to do this kind of oral work until all students feel confident performing independently.

Specific Differentiation Strategies for Students Who Need More Challenge

Additional writing challenge. Students who need more challenge can be asked to analyze and then write about both bacteria (*B. fragilis* and *L. reuteri*). You can also ask these students to address all the evidence presented in the Reasoning Tool and to include all provided evidence in their arguments, rather than choosing only a few pieces.

Standards

Key
Practices Disciplinary Core Ideas Crosscutting Concepts

3-D Statement

Students construct written scientific arguments about how fecal transplants work, using the evidence they have analyzed over the past few lessons about how different bacteria can have helpful or harmful effects on the gut microbiome (scale, proportion, and quantity; cause and effect).

Next Generation Science Standards (NGSS)

NGSS Practices

- Practice 4: Analyzing and Interpreting Data
- Practice 6: Constructing Explanations and Designing Solutions
- Practice 7: Engaging in Argument from Evidence
- Practice 8: Obtaining, Evaluating, and Communicating Information

NGSS Disciplinary Core Ideas

- LS1.A: Structure and Function:
  - All living things are made up of cells, which is the smallest unit that can be said to be alive. An organism may consist of one single cell (unicellular) or many different numbers and types of cells (multicellular). (MS-LS1-1)
- LS2.A: Interdependent Relationships in Ecosystems:
  - Organisms, and populations of organisms, are dependent on their environmental interactions both with other living things and with nonliving factors. (MS-LS2-1)
- LS2.A: Interdependent Relationships in Ecosystems:
  - In any ecosystem, organisms and populations with similar requirements for food, water, oxygen, or other resources may compete with each other for limited resources, access to which consequently constrains their growth and reproduction. (MS-LS2-1)
- LS2.A: Interdependent Relationships in Ecosystems:
  - Growth of organisms and population increases are limited by access to resources. (MS-LS2-1)

NGSS Crosscutting Concepts

- Patterns
- Cause and Effect
- Scale, Proportion, and Quantity

Common Core State Standards for English Language Arts (CCSS-ELA)

- CCSS.ELA-LITERACY.RST.6-8.1: Cite specific textual evidence to support analysis of science and technical texts.
- CCSS.ELA-LITERACY.WHST.6-8.1: Write arguments focused on discipline-specific content.
- CCSS.ELA-LITERACY.WHST.6-8.1.A: Introduce claim(s) about a topic or issue, acknowledge and distinguish the claim(s) from alternate or opposing claims, and organize the reasons and evidence logically
- CCSS.ELA-LITERACY.WHST.6-8.1.B: Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources
- CCSS.ELA-LITERACY.WHST.6-8.2: Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes
- CCSS.ELA-LITERACY.WHST.6-8.2.D: Use precise language and domain-specific vocabulary to inform about or explain the topic.
- CCSS.ELA-LITERACY.WHST.6-8.4: Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience
- CCSS.ELA-LITERACY.WHST.6-8.8: Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation
- CCSS.ELA-LITERACY.CCRA.L.6: Acquire and use accurately a range of general academic and domain-specific words and phrases sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when encountering an unknown term important to comprehension or expression.

Common Core State Standards for Mathematics (CCSS-Math)

CCSS-Math Practices

- CCSS.MATH.PRACTICE.MP1: Make sense of problems and persevere in solving them.
- CCSS.MATH.PRACTICE.MP2: Reason abstractly and quantitatively.
- CCSS.MATH.PRACTICE.MP3: Construct viable arguments and critique the reasoning of others.
- CCSS.MATH.PRACTICE.MP6: Attend to precision.

CCSS-Math Content

- CCSS.MATH.CONTENT.6.SP.5: Summarize numerical data sets in relation to their context.
- CCSS.MATH.CONTENT.7.SP.1: Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences.

1 WARM-UP
Warm-Up

Warm-Up

5 MIN

Students exhibit and evaluate their own expertise about different types of bacteria.

Instructional Guide

1. Project Warm-Up, students work independently. Collapse the instructional guide and project the student screen, or have students turn to page 64 of the Investigation Notebook. Allow a few minutes for students to individually respond to the Warm-Up.

Teacher Support

Rationale

Pedagogical Goals: Understanding the Nature of Science
One goal set forth by the Next Generation Science Standards (NGSS) is for students to understand the nature of science as a discipline and how scientific knowledge develops over time. The NGSS calls out eight understandings about the nature of science which are woven throughout the Amplify Science curriculum. This unit gives students an opportunity to experience the understanding that Scientific Knowledge Is Based on Empirical Evidence. Specifically, the Warm-Up and the discussion that follows illustrate the idea that scientific values function as criteria in distinguishing between science and nonscience. Students have a chance to consider the credibility and possible bias of a source of information based on how a claim is supported or not supported by evidence.

Possible Responses

Answers will vary. Example: I do not think Senator Naismith is making a good scientific argument because he does not support his claim with evidence based on anything other than his own opinion.

2 WRITING
Using the Reasoning Tool

Using the Reasoning Tool

20 MIN

Partners select the strongest pieces of evidence and organize them, using the Reasoning Tool.

Instructional Guide

1. Ask students to share ideas from the Warm-Up.

2. Summarize reasons why Senator Naismith is not making a scientific argument.

Senator Naismith claims that "fecal transplants will make people sick," but he does not back it up with scientific evidence. "I think poop is gross" is an opinion, so it is not good evidence for why it will make people sick. When you make your arguments, remember to support your claims with strong scientific evidence.

Senator Naismith also does not connect his evidence to his claim. When you make your arguments, remember to explain why your evidence supports your claim.

3. Distribute Evidence Gradients and Bacteria Evidence Card Sets to partners. Give partners a minute or two to review their evidence and place it on the Evidence Gradients again, under the correct subclaim. Explain that they can rework the placement of the evidence cards if their thinking is now different than it was in the previous lesson.

4. Have students choose a subclaim. Collapse the instructional guide and project the student screen, or have students turn to pages 65–66 of the Investigation Notebook. Prompt students to use their card sort to choose a subclaim that they will use in their arguments.

5. Project Reasoning Tool and remind students how to use it. Collapse the instructional guide and project the student screen. Explain that students should choose the evidence they want to include in their arguments, based on their work with the Evidence Gradient. They will summarize this evidence in the first column of the Reasoning Tool and explain why the evidence matters in the middle column. They should write the subclaim that the evidence supports in the third column (or they can write part of the subclaim if the evidence only supports a piece of it).

6. Remind students of Reasoning Tool's purpose. Explain that the Reasoning Tool will help students organize their evidence. Point out that the reasoning they add about each piece of evidence in the middle column will help them write convincing arguments in the next part of the lesson. Explain that pairs should share their Evidence Gradients, but that each student should complete her own Reasoning Tool.

7. Students complete Reasoning Tools. Encourage pairs to discuss their thinking as they individually complete their Reasoning Tools.

Teacher Support

Instructional Suggestion

Diverse Learners: Students Who Are Struggling with Summarizing Visual Evidence in the Reasoning Tool
Some of the evidence on the Bacteria Evidence Cards is presented with graphics, such as pie charts, and will need to be summarized in text form in the Reasoning Tool and, ultimately, in the written argument. If a student is struggling with converting the evidence from one form to another, have them describe orally what the evidence shows and then help them translate that into a written note for the first column of the Reasoning Tool.

Possible Responses

For Subclaim 2:

Evidence
In experiments with mice, mice with *B. fragilis* in their guts had higher numbers of immune cells than those with no bacteria in their guts (Evidence Card H).
This matters because . . .
In the case study, we saw that after a fecal transplant, the amount of *B. fragilis* in the patient's gut increased (Evidence Card F).
Therefore, . . .
Bacteria from the fecal transplant can help the patient's body produce immune cells that kill invading bacteria.

Evidence
The article "Bacteria: *B. fragilis*" states that bacteria such as *B. fragilis* help the body produce immune cells (Evidence Card D).
This matters because . . .
In the case study, we saw that after a fecal transplant, the amount of *B. fragilis* in the patient's gut increased (Evidence Card F).
Therefore, . . .
Bacteria from the fecal transplant can help the patient's body produce immune cells that kill invading bacteria.

For Subclaim 3:

Evidence
In experiments with mice, mice with *L. reuteri* in their guts had higher amounts of gut mucus than those with no bacteria in their guts (Evidence Card I).
This matters because . . .
In the case study, we saw that after a fecal transplant, the amount of *L. reuteri* in the patient's gut increased (Evidence Card F).
Therefore, . . .
Bacteria from a fecal transplant can help the patient's body produce mucus that protects the gut from invading bacteria.

Evidence
The article "Bacteria: *L. reuteri*" says that bacteria such as *L. reuteri* help the gut produce mucus (Evidence Card J).
This matters because . . .
In the case study, we saw that after a fecal transplant, the amount of *L. reuteri* in the patient's gut increased (Evidence Card F).
Therefore, . . .
Bacteria from the fecal transplant can help the patient's body produce mucus that protects the gut from invading bacteria.

3 WRITING
Writing Final Argument Paragraphs

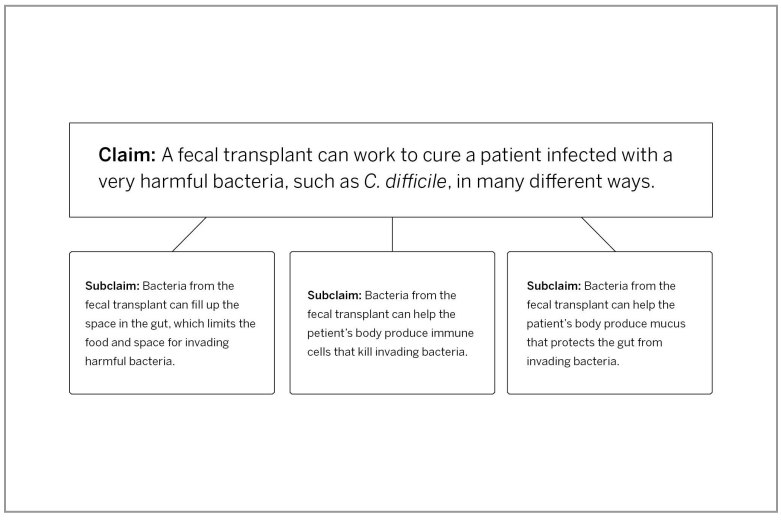
Writing Final Argument Paragraphs

20 MIN

Students write an argument in support of either Subclaim 2 or Subclaim 3.

Instructional Guide

1. Project claim and subclaims. Read the overarching claim and remind students that they are using a series of smaller arguments to support the larger claim.



2. Point out the subclaims. Explain that this projection shows the three subclaims as part of a larger argument. Remind students that they already wrote about the subclaim related to food and space. Point out that, today, some students will write an argument in support of the subclaim about immune cells and others will write an argument in support of the subclaim about gut mucus.

3. Point out where students should add their subclaims. Explain that students should select the subclaim they are using in their arguments from the dropdown box on their screens, or check one of the subclaims at the top of page 67 of the Investigation Notebook.

4. Point out the Argumentation Sentence Starters on the wall. Explain that students can use one or more of these sentence starters to help them write and construct their argument paragraphs. The sentence starters are available on students' screens or on page 67 of the Investigation Notebook.

5. Have students write their arguments. Encourage them to refer to their work in the Reasoning Tool. If using devices, students can copy their work from the Reasoning Tool in Activity 2.

6. On-the-Fly Assessment: Limited Growth and Competition Among Microorganisms. For further suggestions on how to support students' understanding in their final arguments of interdependent relationships in ecosystems, press the hummingbird icon and select ON-THE-FLY ASSESSMENT.

7. Collect Evidence Gradients and Bacteria Evidence Card Sets. When students are finished, collect the card sets and the Evidence Gradients and save for future use.

8. Point out the homework to students (Activity 4 or pages 69–70 of the Investigation Notebook). If students do not have access to Amplify Science at home, provide them with copies of pages 69–70 from the Investigation Notebook. Explain that students will evaluate and revise their drafts of their new written arguments for homework.

9. Optional: Point out the family homework experience (Activity 5). If you want students to complete this activity, describe how they will explain the human microbiome to a family member. If students do not have access to Amplify Science at home, provide them with a copy of the Family Homework Experience: Explaining the Human Microbiome at Home student sheet.

Embedded Formative Assessment

On-the-Fly Assessment 6: Limited Growth and Competition Among Microorganisms

Look for: Students take into account ideas related to interdependent relationships in ecosystems while writing their arguments in this lesson. As you read through students' arguments, pay attention to whether they

- acknowledge that access to resources limits growth of microorganisms in the gut.
- explain that microorganisms in the gut compete for limited resources.

Now what? There will be more opportunities to learn about these ideas in the *Populations and Resources* unit. Make note of your students' grasp of them and use this information as you plan the *Populations and Resources* unit. Start by reminding them of their experiences studying the human microbiome. Consider having them return to their final arguments about fecal transplants to add any additional ideas after they complete the *Populations and Resources* unit.

Teacher Support

Instructional Suggestion

Going Further: Sharing Arguments
You may wish to extend this lesson by having students share their arguments with one another. You may choose to display example arguments on the scientific argumentation wall, as well, so you can reference them in future units and provide a showcase of student work at the same time. You may also choose to have students revise and create more polished essays as a separate final project; students could work together in new groups to blend their writing for each subclaim, or students could do a jigsaw in order to teach and learn the other content before writing more. Possible extensions and cross-disciplinary lessons could include working with an ELA teacher to edit and revise the arguments for tone or audience.

Instructional Suggestion

Going Further: Expressing Arguments in Other Modalities
Once students have written their arguments, you could choose to have students present their arguments in another format. For instance, one teacher chose to have her students film campaign videos in response to the senator. Another teacher had his students put their arguments into the body of a letter to the head scientist.

Instructional Suggestion

Diverse Learners: Students Who Are Struggling with Moving from the Reasoning Tool to the Written Argument
If you notice some students are having trouble taking a row of the Reasoning Tool and converting it into a sentence or two of written work, you may want to pull these students aside and ask them to orally translate each row before writing it into their arguments. Continue this until you think these students can continue independently.

Instructional Suggestion

Diverse Learners: English Learners and Other Students Who Are Struggling with Writing
Create a word bank on the board to provide students with helpful words to include in their written arguments. You might include the following words:

- bacteria
- case study
- data
- evidence
- experiment
- fecal transplant
- gut microbiome
- immune cells
- microbiome

- mucus
- treatment

Instructional Suggestion

Math Practices: Attend to Precision
As students generate their final scientific arguments about Patient 23, they will have many opportunities to attend to precision as they use evidence from the pie charts to explain why the fecal transplant cured the patient of the *C. difficile* infection. Attending to precision means that students aim to communicate precisely to others, both in the evidence they present and the corresponding reasoning that links this evidence to a claim. As students refer to the pie charts as evidence, support them in presenting key elements of these visual representations with precision that is appropriate for the arguments they are aiming to make. Students attending to precision should also use clear definitions to describe the evidence they present and give careful explanations of the problems they are aiming to solve.

Possible Responses

For Subclaim 2:
Bacteria from the fecal transplant can help the patient's body produce immune cells that kill invading bacteria. In experiments with mice, mice with *B. fragilis* in their guts had higher numbers of immune cells than mice with no bacteria in their guts. In addition, the article "Bacteria: *B. fragilis*" says that these bacteria "help the body produce immune cells that kill harmful bacteria." Both of these pieces of evidence show that *B. fragilis* can help the body produce immune cells. This matters because data from the case study shows that after the fecal transplant, the patient had higher numbers of the bacteria group that includes *B. fragilis,* and this shows that the fecal transplant increased the amount of *B. fragilis.* This means that a fecal transplant can cure patients infected with harmful bacteria by increasing the amount of *B. fragilis,* which help the body produce immune cells that fight the harmful bacteria.

For Subclaim 3:
Bacteria from the fecal transplant can help the patient's body produce mucus that protects the gut from invading bacteria. In experiments with mice, mice with *L. reuteri* in their guts had higher levels of gut mucus than mice with no bacteria in their guts. In addition, we read in the article "Bacteria: *L. reuteri*" that bacteria such as *L. reuteri* help the gut produce mucus. Both of these pieces of evidence show that *L. reuteri* can help the body produce gut mucus. This matters because data from the case study shows that after the fecal transplant, the patient had higher amounts of the bacteria group that includes *L. reuteri.* This means that a fecal transplant can cure patients infected with harmful bacteria by increasing the amount of *L. reuteri* bacteria, which can help the body produce more gut mucus to fight off harmful bacteria.

4 HOMEWORK
Homework

Homework

Students evaluate the arguments they wrote and revise them, if needed.

Instructional Guide

1. If needed, make additional time to explain homework. If students do not have access to Amplify Science at home, provide them with copies of pages 69–70 from the Investigation Notebook.

Possible Responses

Answers will vary as this is a self-evaluation of students' written arguments based on the following criteria:

- I stated the claim clearly.
- I included evidence to support the claim.
- I made my reasoning clear by explaining how the evidence supports the claim.

Students also have an opportunity to improve upon their in-class writing. See the Possible Responses tab in Activity 3.

5 HOMEWORK
Family Homework Experience (optional)

Family Homework Experience (optional)

Students explain the human microbiome to someone in their household.

Instructional Guide

1. If needed, make additional time to explain the optional family homework experience. If students do not have access to Amplify Science at home, provide them with copies of the Family Homework Experience: Explaining the Human Microbiome at Home student sheet.

Teacher Support

Rationale

Pedagogical Goals: Purpose of the Family Homework Experience
This optional homework activity is designed to give students a chance to share what they have learned during the unit with a member of their household. This provides practice with conveying scientific material to a new audience, which can help students develop skills in organizing their own ideas and improve their understanding and argumentation ability. This activity can also encourage interaction and discussion between students and their families around science concepts, which has been found to be beneficial for student learning.

Possible Responses

What did your household member learn about the human microbiome?
Answers will vary.